

WHAT IS CLAIMED IS:

1 1. A computerized pronunciation system configured to generate
2 pronunciations for words that are represented by waveforms and text, such that the
3 pronunciations are spelled by phones in a phonetic alphabet for storage in a pronunciation
4 dictionary, the system comprising:

5 a word list including at least one word;
6 transcribed acoustic data including at least one waveform for the word and
7 transcribed text associated with the waveform;

8 a pronunciation-learning module configured to accept as input the word list
9 and the transcribed acoustic data, the pronunciation-learning module including:

10 sets of initial pronunciations of the word,

11 a scoring module configured score pronunciations and to generate
12 phone probabilities, and

13 a set of alternate pronunciations of the word, wherein the set of
14 alternate pronunciations include a highest-scoring set of initial pronunciations with a
15 highest-scoring substitute phone substituted for a lowest-probability phone; and

16 a pronunciation dictionary configured to receive the highest-scoring set of
17 initial pronunciations and the set of alternate pronunciations.

1 2. The system of claim 1, wherein the transcribed acoustic data includes
2 a plurality of waveforms for the word, and
3 transcribed text for each waveform of the plurality of waveforms.

1 3. The system of claim 2, wherein the plurality of waveforms are acoustic
2 representations of the word spoken by a plurality of speakers.

1 4. The system of claim 1, wherein the word list includes a plurality of
2 words.

1 5. The system of claim 4, wherein the transcribed acoustic data includes
2 a plurality of waveforms for the plurality of words, and
3 transcribed text for each waveform of the plurality of waveforms

1 6. The system of claim 5, wherein the waveforms of the plurality of
2 waveforms are acoustic representations of the plurality of words spoken by a plurality of
3 speakers.

1 7. The system of claim 1, wherein the pronunciation-learning module is
2 further configured to:
3 force-align the sets of initial pronunciations to the waveform; thereafter
4 generate the set of alternate pronunciations; and
5 add the set of alternate pronunciations to the pronunciation dictionary.

1 8. The system of claim 7, wherein the scoring module is configured to
2 score the sets of initial pronunciations.

1 9. The system of claim 8, wherein the scoring module is configured to
2 generate a phone probability for each phone in a highest-scoring set of initial pronunciations
3 and for each substitute phone in a set of substitute phones.

1 10. The system of claim 1, wherein the phone probabilities are posterior
2 probabilities.

1 11. The system of claim 1, further comprising a letter-to-phone engine
2 configured to generate initial pronunciations from which the sets of initial pronunciations are
3 generated.

1 12. The system of claim 1, wherein initial pronunciations from which the
2 sets of initial pronunciation are generated are extracted from the pronunciation dictionary.

1 13. The system of claim 1, where in the scoring module includes an
2 automatic speech recognition (ASR) system configured to score the sets of initial
3 pronunciations.

1 14. The system of claim 13, wherein the pronunciation-learning module is
2 further configured graph the sets of initial pronunciations, and the ASR system is configured
3 to score graphed sets of initial pronunciations.

1 15. The system of claim 13, wherein the ASR system is further configured
2 to generate transcriptions of acoustic data spoken by a plurality of speakers, and wherein the
3 transcriptions are included in the transcribed acoustic data.

1 16. The system of claim 15, wherein the ASR system is further configured
2 to collect feedback from the plurality of speakers to affirm correct recognition by the ASR
3 system, and if recognition is correct, enter the transcribed words in the transcribed acoustic
4 data.

1 17. A computerized pronunciation system configured to generate
2 pronunciations for words that are represented by waveforms and text, such that the
3 pronunciations are spelled by phones in a phonetic alphabet for storage in a pronunciation
4 dictionary, the system comprising:

5 a word list including at least one word;
6 transcribed acoustic data including at least one waveform for the word and
7 transcribed text associated with the waveform;

8 a pronunciation-learning module configured to accept as input the word list
9 and the transcribed acoustic data, the pronunciation-learning module including:

10 sets of initial pronunciations of the word,
11 an automatic speech recognition (ASR) system configured to score
12 pronunciations,
13 a scoring module configured to generate phone probabilities, and
14 a set of alternate pronunciations of the word, wherein the set of
15 alternate pronunciations include a highest-scoring set of initial pronunciations with a
16 highest-scoring substitute phone substituted for a lowest-probability phone; and
17 a pronunciation dictionary configured to receive the highest-scoring initial
18 pronunciation and a highest-scoring set of alternate pronunciations.

1 18. The system of claim 17, wherein the word list includes a plurality of
2 words.

1 19. The system of claim 18, wherein the transcribed acoustic data includes
2 a plurality of waveforms and transcribed text for the plurality of words.

1 20. The system of claim 19, wherein the waveforms of the plurality of
2 waveforms are acoustic representations of the plurality of words spoken by a plurality of
3 speakers.

1 21. The system of claim 17, further comprising a letter-to-phone engine
2 configured to generate initial pronunciations from which the sets of initial pronunciations are
3 generated.

1 22. The system of claim 17, wherein initial pronunciations from which the
2 sets of initial pronunciation are generated are extracted from the pronunciation dictionary.

1 23. The system of claim 17, wherein the ASR system is configured to
2 score graphed sets of initial pronunciations.

1 24. The system of claim 17, wherein the ASR system is configured to
2 generate transcriptions of acoustic data spoken by a plurality of speakers, wherein the
3 transcriptions are included in the transcribed acoustic data.

1 25. The system of claim 24, wherein the ASR system is further configured
2 to collect feedback from the plurality of speakers that the transcriptions generated by the ASR
3 system are words spoken by the plurality of speakers, and wherein if the collected feedback
4 affirms correct recognition by the ASR system, the transcriptions are entered in the
5 pronunciation dictionary.

1 26. A computerized pronunciation system configured to generate
2 pronunciations for words that are represented by waveforms and text, such that the
3 pronunciations are spelled by phones in a phonetic alphabet for storage in a pronunciation
4 dictionary, the system comprising:
5 a word list including a plurality of words;
6 transcribed acoustic data including a set of waveforms for each of the words
7 and a set of transcribed text corresponding to the waveforms;
8 a pronunciation-learning module configured to accept as input the word list
9 and the transcribed acoustic data, the pronunciation-learning module including:
10 sets of initial pronunciations of the plurality of words,

11 sets of alternate pronunciations of the plurality of words, wherein each
12 set of alternate pronunciations includes a highest-scoring set of initial pronunciations
13 with a unique substitute phone substituted for a lowest-probability phone of the
14 highest-scoring set of initial pronunciations;
15 a scoring module configured score the sets of initial and alternate
16 pronunciations and to generate phone probabilities; and
17 a pronunciation dictionary configured to receive the highest-scoring initial
18 pronunciation and a highest-scoring set of alternate pronunciations.

1 27. The system of claim 26, wherein the sets of alternate pronunciations
2 further include a set of alternate pronunciations that include the highest-scoring initial
3 pronunciation with the lowest-probability phone removed.

1 28. The system of claim 26, wherein the sets of alternate pronunciations
2 further include additional sets of alternate pronunciations that include the highest-scoring
3 initial pronunciation having a unique phone inserted adjacent to the lowest-probability phone.

1 29. The system of claim 26, wherein the sets of alternate pronunciations
2 further include additional sets of alternate pronunciations that include the highest-scoring
3 initial pronunciation having a sequence of two phones substituted for the lowest-probability
4 phone.

1 30. The system of claim 26, wherein the sets of alternate pronunciations
2 further include additional sets of alternate pronunciations that include the highest-scoring
3 initial pronunciation having the lowest-probability phone and a right neighboring phone
4 substituted with a unique phone.

1 31. The system of claim 26, wherein the sets of alternate pronunciations
2 further include additional sets of alternate pronunciations that include the highest-scoring
3 initial pronunciation with the lowest-probability phone and a left neighboring phone
4 substituted with a unique phone.